

Mitigating the Possibility of Contact with High Voltage While Working on Muon Detector Systems

Revision Log

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Approvals

Dmitri Denisov
Forward Muon Group Leader

12/21/00
Date

H.Tom Diehl
Central Muon Group Leader

12/21/00
Date

Rick Hance
Project Electrical Engineer

12/26/00
Date

William S. Freeman
Asst. Project Manager

12/21/00
Date

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1 INTRODUCTION

1.1 Purpose

This procedure provides instructions on how to safely avoid contact with bias voltages from the DØ high voltage system while working on the central or forward muon detector systems.

1.2 Scope and Applicability

The muon high voltage is normally controlled by software operated by detector experts or shift personnel from the DØ control room. Following this procedure is required of anyone who may be exposed to bias voltages from the DØ high voltage system while working on the MDTs, forward pixel counters, central PDTs (WAMUS), or central scintillators (A-Phi and Cosmic Cap). The appropriate muon detector system group leaders (Central or Forward) shall insure that such workers are competent in the use of this procedure.

This procedure does not address the maintenance or repair of DØ high voltage supplies.

2 PRECAUTIONS AND LIMITATIONS

- A. Failure to follow this procedure could result in surprising and/or painful electrical shock, with added risk because the work sometimes occurs on ladders or elevated platforms.

3 PREREQUISITE ACTIONS

3.1 Equipment

- [1] Obtain SHV shorting connector or other suitable grounding device.

4 PROCEDURE

4.1 Power Supply Disablement

- [1] Inform the DØ Control Room shift personnel (if present) that work is going to be performed on the central or forward muon system.
- [2] Do one of the following:
 - [a] Request that the shift personnel set the H.V. software controls to the DISABLED state for the relevant detector components/channels.
 - [b] Turn off the high voltage(s) to the relevant detector components/channels by setting their software state to DISABLED.
 - [c] Turn off the power supply to the relevant crate(s).
- [3] Verify that the high voltage has been disabled.
- [4] IF work is expected to take more than one hour, THEN do the following:
 - [a] Place caution tags on the relevant crate(s);
 - [b] Place a note on the muon software control window in the DØ Control Room;
 - [c] Place a note in the control room logbook, concerning the work.

4.2 Disconnecting Cables

NOTE: *About a minute after disabling the high voltage, most of the stored charge in the cables and high voltage modules will have dissipated through resistors in the high voltage modules. Disconnect cables as close to the detector as possible to minimize the risk. The normal and preferred situation is to disconnect cables only at the relevant detector elements (PDTs, MDTs, PMTs), and leave them connected at the HV module end to maintain a discharge path. If cables need to be unplugged at the high voltage modules or anywhere in between, care must be taken to discharge any stored charge in the cables. An SHV shorting connector is useful for this purpose.*

If high voltage of a few thousand volts has been applied for several hours and then a cable is disconnected without a discharge path, stored charge in the cable dielectric will leak out and recharge the cable. Typical recharge voltages are about 10% of the applied high voltage.

4.2 Disconnecting Cables (continued)

- [1] Disconnect high voltage cables, as needed. For detectors with more than one HV input (WAMUS and MDTs), insure that all HV cables are disconnected.
- [2] Discharge wires and pads, using an SHV shorting connector or other suitable grounding device (WAMUS system only).

4.3 Restoring Service

- [1] Remove any shorting connectors and plug the high voltage cables back into their connectors to the detector or the modules from which they were disconnected, after completing work.
- [2] Verify that no one else is working on the high voltage system.
- [3] Restore the relevant high voltage to the appropriate condition (either stand-by or 100%), or ask the shift personnel on duty to do it.
- [4] IF caution tags and/or console notes were used, THEN remove them.
- [5] IF an entry was placed in the control room logbook concerning the work, THEN indicate in the logbook that the work was completed.